



THE UNIVERSITY OF
SYDNEY

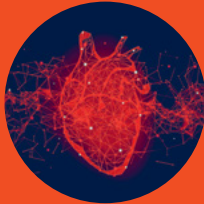
Giving today. *Changing tomorrow.*

Neuroscience
research is music
to the ears

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We acknowledge the tradition of custodianship and law of the Country on which the University of Sydney campuses stand. We pay our respects to those who have cared and continue to care for Country.



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From the Chancellor *and* Vice-Chancellor

OUR HARD-WORKING COMMUNITY has thrived through 2022, adapting well to the challenges of the new 'COVID normal'. Our dedicated and brilliant researchers continue to excel at driving innovative change and solving difficult challenges, through clever collaborations that tap into the expertise and resources of various disciplines and external partners. At the same time, it's very pleasing to see our students making the most of their education and living up to their potential of becoming leaders of the future. And, as always, our alumni continue to be a reliable source of support and inspiration as they make their own substantial impacts in Australia and around the world.

It's heartening to see students return to campus-based teaching and do their part to bring our classrooms back to life, safely but surely. Our current hybrid learning model has been a great success story and a prime example of how adversity brings out the best in our staff, who work tirelessly to ensure we deliver a world-class education for students in person and online. While COVID has meant that many international students have not been able to join us for periods in person, it is a tribute to the quality of our offering and reputation that we have been so successful in steering students carefully throughout the COVID disruption.

We're also thrilled that sport and other extracurricular activities are returning to pre-COVID volumes as it's so important that students have a well-rounded experience with us and enjoy unforgettable memories and friendships beyond the classroom.

Looking forward, our ambition is to elevate the University to a position among the world's greatest universities, and, after much consultation with our own people and the wider community, our new 10-year strategy will give us a perfect framework for achieving this status. The University is at its strongest when it draws talent from every part of society. That is why one of our biggest priorities for the next decade is doing everything we can to convince students from all walks of life that Sydney should be their destination of choice. This is a difficult challenge, but our current students often tell us that scholarships

and bursaries can be pivotal to them having a smooth and enjoyable experience at the University. We realise that we need to not only seek out students with enormous potential, but also maximise pathways into the University and give them all possible support throughout their journey. This is where our donors come in – your remarkable generosity is the key to making this all happen and can be life-changing for students.

This publication showcases a small selection of the University's countless stories of philanthropic impact over the last year. The comprehensive scope of the stories you'll read – which cover innovative bowel cancer research, green hydrogen power, preserving an historic pathology collection, and using the gift of music to counter cognitive decline – demonstrate the combined power of our university community. Your gifts will have a profound impact for generations to come.

We're humbled by your faith in us. It's thanks to people like you – and your unwavering dedication to supporting excellence in research and education – that we're able to collectively improve so many lives. As we look to the future of our university and implement our new strategy, we are forever grateful for your visionary support and proud that you are part of our extraordinary community.



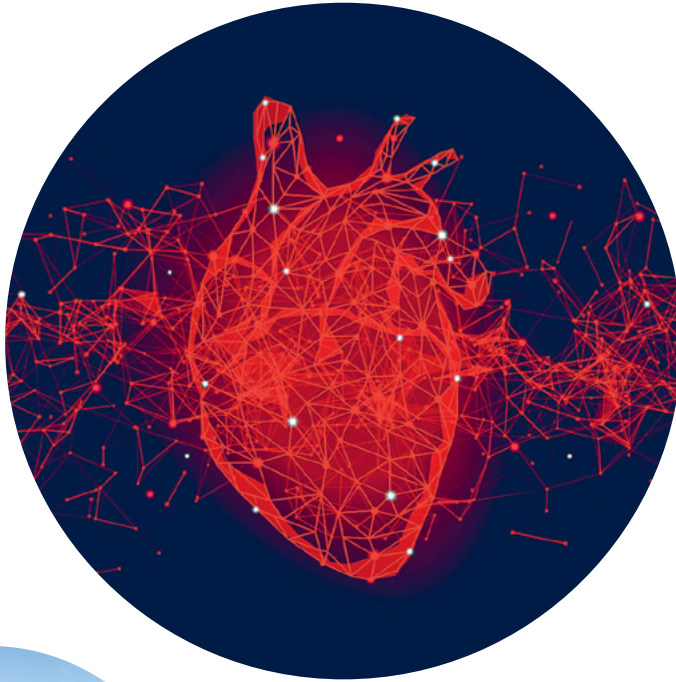
Belinda Hutchinson

Belinda Hutchinson AC
Chancellor
(BEd '76)



Mark Scott

Mark Scott AO
Vice-Chancellor and President
(BA '84, DipEd '84, MA '93, HonDLitt '15)



2.

Each gift moves us towards a better future, improving our understanding of the world and creating opportunities for students of all backgrounds. These stories provide a snapshot into how our extraordinary supporters are driving excellence across the University.



1.

Snapshot of 2021 & 2022



3.

1. The art of attraction

The Chau Chak Wing Museum will benefit from continued exhibition funding thanks to Ana-Maria Zaugg and David Anstice AO. Their gift will allow for state-of-the-art planning, research, design, and display of exhibitions. Drawing from local and international artists, the museum attracts visitors from all over the world, making it a vibrant cultural hub and learning asset.

2. Early identification of heart attack risk

A generous \$1 million gift from entrepreneurs Chris and Julia Vonwiller to the Digital Sciences Initiative will fund two significant postdoctoral positions. In these roles, researchers will devise algorithms to analyse extensive imaging data to unravel novel biomarkers of heart disease in its early phases in people with no other indicators. This essential work will enable us to ultimately prevent heart attacks in patients who didn't even know they were at risk.

3. Inspiring Australian literature

The University has secured the great talent of Dr Meg Brayshaw for the coveted John Rowe Lecturer in Australian Literature position, funded by a generous bequest. Spanning topics from Australian women writers to climate fiction, Brayshaw's research and teaching guides students into contemporary global conversations, granting them a deeper understanding of the diverse and vibrant body of Australian literary works.

4. The legacy of family love

In one of the largest ever crowdfunded gifts to the University, family and friends of human rights activist Harris van Beek raised \$110,000 in his memory for pancreatic cancer research in 2017. Having seen the positive impact of this gift on patient outcomes, including improved responses to treatment and quality of life, Harris's wife Jane and their children, Anna, Peter and Tom, continue to support the research team, and have created a legacy in Harris's name with a research fund.



4.



7.



6.



5.



8.

5. Enhancing Buddhist Studies

The US-based Buddhist non-profit Khyentse Foundation has gifted \$3.5 million to fund a senior academic position in Tibetan Buddhist Studies for the next 20 years, underpinning research, teaching and public engagement in this area. This amplifies the University's broader commitment to providing rich programs in language and culture, to better understand other nations, traditions, and peoples - and thereby our place in the world.

6. Improving oral health

Gifts from two longstanding partnerships will contribute to oral health initiatives within the Sydney Dental School. The Australian Society of Orthodontists NSW Branch have generously committed to supporting priority areas in orthodontics, while Colgate-Palmolive is uplifting the next generation of dental professionals, giving toward Bachelor of Oral Health student stipends and Doctor of Dental Medicine student research.

7. Helping students soar

Barriers such as coming from a rural, refugee or Indigenous background, financial insecurity, or being the first in their family to enrol can feel insurmountable for prospective students dreaming of attending university. In the last 12 months, donors have contributed \$171,000 towards equity scholarships, and \$267,000 towards emergency student bursaries, helping us to achieve our vision of education for all.

8. For the love of animals

The NSW Wildlife Information Rescue and Education Service (WIRES) has generously committed to the Koala Health Hub, supporting koala care and research after the devastating bushfires of recent years. WIRES is also contributing to enhanced understanding of Lorikeet Paralysis Syndrome, which results in many intensive care admissions. The University community became 'citizen scientists' to help record dietary observations to determine which plants might be causing the disease.



WORDS by Harriet Ticehurst

PHOTOGRAPHY by Louise M Cooper

DEGREE BE(Hons) '20 and LLB '20

Empowering a brighter future

A scholarship has bolstered Rameen Malik's
vision of an equitable resource sector at
home and around the world.

“OPPORTUNITIES LIKE THIS – FOR STUDENTS LIKE ME – MEAN MORE THAN THE AMOUNT OF MONEY WE RECEIVE... WHERE I AM TODAY IS IN PART BECAUSE OF MY DONOR’S INVESTMENT IN ME.”

- Rameen Malik

The door to Rameen Malik’s family home has always been open: a light left on, a warm meal provided and a comfortable bed to sleep on for anyone who needs it. “I’ve always seen people coming in and out of my house,” she remembers fondly. “In my family, it’s about paying it forward by whatever means possible.”

Malik credits her confidence and inspiration to growing up in Lakemba, Western Sydney. With family roots in Pakistan, her community has played a critical role in her upbringing. Like a stone being dropped into a puddle of water, causing a ripple effect, Malik was taught that your actions matter, and the opportunities afforded to you should always flow back to benefit your community.

From a young age, Malik has associated a reliable source of energy with a sense of security and comfort. As she explains, “Stories from the women in my life influenced my relationship with the resource and energy sector.”

Malik recounts how her aunt – a healthcare worker – delivers oral polio vaccine drops to children across Pakistan, struggling to preserve them without proper refrigeration technology. Amidst rising temperatures in Pakistan, another aunt has single-handedly spearheaded a solar power initiative on her farm. As our climate changes and temperatures rise, it is amplifying an existing divide between those who have resources and those who do not. For Malik, this is a fact that hits close to home. “Growing up, there were often struggles to pay the power bill, water bill or rent during increasingly hot summers.”



In her final years of high school, Malik's family received the devastating news that a close family friend had passed away from heatstroke in one of Pakistan's ever more common and brutal heatwaves. At this profound and pivotal moment, Malik grappled with the idea that her family's loss may have been prevented by access to an electricity system that could withstand unprecedented summer temperatures.

When it came time to decide what and where to study, she looked to her family and the ways in which their lives had interacted with energy and climate. This 'duality of electricity' as she calls it, motivated her to better understand how technology could be used as a tool for social equity. To Malik, an engineering degree would allow her to innovate towards a more equitable resource sector, while a degree in law would reinforce her social justice lens.

By the following year, Malik had her heart set on a Bachelor of Engineering and Bachelor of Laws. Acutely aware of the financial hurdles facing her at university, Malik applied for a philanthropically-funded scholarship in the Faculty of Engineering.

From the moment the phone rang to tell her she had been successful, Malik has made the most of every opportunity that has come her way. "When I found out, I felt this sigh of relief," says Malik. "This scholarship meant I could work less and focus on my studies – it gave me faith in my abilities to excel as much as my peers and the chance to participate in activities beyond the classroom."

Malik's studies took her to Samoa to investigate how engineering could help taro farmers increase their seasonal earnings, and to the Torres Strait Islands to better her understanding of climate change's impact on community health and wellbeing – all before returning home to her local girls' high school to share her story through hands-on engineering workshops.



Rameen and her parents at her graduation ceremony.

Photography supplied

Malik wants any young woman considering studies in engineering or applying to scholarships to realise their value. "I want her to see someone wearing a hijab who has studied engineering, and I want her to know that there is a place for her," she says. "If you're staying true and genuine to who you are and what you're passionate about, then you will make it."

Seven years on, Malik – an empowered and determined graduate – has been announced as the Fulbright Anne Wexler Scholar in Public Policy for 2022. She will soon fly to the United States to study a Master of Technology and Policy at the Massachusetts Institute of Technology (MIT). Here, Malik aims to cast a multidisciplinary lens on the transition to a low-emissions electricity sector, with a focus on emerging energy technologies and data-driven policy development. But her eyes remain trained on home and her community – she intends to one day bring her expertise in energy equity, justice and innovation to Australia's energy policies.

To the donor who has supported her through her undergraduate studies, Malik is immensely grateful. "I am so proud to have been the recipient of an equity scholarship. Opportunities like this – for students like me – who come from hard-working, immigrant communities, mean more than the amount of money we receive. I have no doubt that where I am today is in part because of my donor's investment in me." 🌸



WORDS by Cassandra Hill

PHOTOGRAPHY by Stefanie Zingsheim

Keeping music *in mind*

A new collaboration between the University of Sydney's Brain and Mind Centre and the Sydney Conservatorium of Music is exploring whether musical interventions could help those at risk of cognitive decline.

Music has long been recognised for its profound effects on mental health and wellbeing. Greek philosophers Plato and Aristotle spoke of its ability to promote order in the soul, while music programs were used during World Wars I and II to aid the recovery of soldiers.

“Studies of young people have shown that playing a musical instrument increases brain connectivity,” says Professor Sharon Naismith, lead researcher at the University of Sydney’s Brain and Mind Centre (BMC). “And although anecdotally we know that music can be a powerful and highly effective form of health intervention for older people experiencing cognitive decline, we have very little scientific evidence.”

In 2022, around half a million Australians are living with dementia, which is expected to more than double by 2058. With researchers yet to find a cure, a key

question focuses on prevention: can we slow the rate of cognitive decline to avoid dementia?

Joining forces with a multidisciplinary team of musicians, psychologists, bioengineers, imaging experts and neurologists, Naismith is determined to find out.

In collaboration with the Memory and Cognition Clinic at the Royal Prince Alfred Hospital, the researchers will engage older people at risk of cognitive decline in musical activities, such as learning an instrument, taking part in a choir or orchestra, listening to music, or attending a concert or musical discussion group. They’re hoping to create an evidence base to support the wider implementation of musical interventions for people with mild cognitive impairment, the stage before dementia develops.

Sydney Conservatorium of Music’s Associate Dean of Research, Professor Neal Peres Da Costa (BMus ’87), is excited that his team can contribute to the understanding of this problem.

“It’s incredibly thrilling to be involved in this multidisciplinary research program to combine music, which has undeniable cultural benefits, with other disciplines, to contribute to solving real-world problems in medical and brain research,” says Professor Peres Da Costa.

“Music training and music making enable us to use our senses in such complex patterns – developing our motor skills and through our emotional reactions to music. All of us know someone who has been tragically affected by dementia and we’re interested to know how the music training experience,

intensified with educational, concert and other related activities, will improve the neuroplasticity for participants in the early stages of cognitive decline.”

The research program has been made possible through the generous gift of more than \$1.7 million by Barbara Spencer, in honour of her late partner, Lance Bennett (BA(Hons) ’58). The Spencer-Bennett NeuroMusic Collaborative stemmed from conversations between Spencer and the Advancement team.

Spencer described her vision for a gift that would create new research

parameters and lead to the possibility of health benefits for people affected by dementia. She expressed interest in prevention, and as the conversations unfolded, Spencer reflected on the love of music that she and Lance shared over their 49 years as a couple.

“Both of us were educated to enjoy classical music. When we first set up house in Darwin together in the mid-1960s, a quality sound system was given priority over tables and chairs,” Spencer says. “Our visits to Sydney were planned around music performances, including at the Sydney Conservatorium of Music, which will always hold many happy memories.”

Lance Bennett won a scholarship to the University of Sydney, majoring in French and English, before studying at the National Institute of Dramatic Art (NIDA). He worked as a theatre, TV, and radio actor for several years. Bennett also developed close personal connections with First Nations communities through his mother, an art collector, and was the Aboriginal Cultural Foundation’s director for 25 years. Bennett and Spencer worked with communities



“MUSIC CAN LIFT US OUT OF DEPRESSION OR MOVE US TO TEARS – IT IS A REMEDY, A TONIC, ORANGE JUICE FOR THE EAR.”

- Oliver Sacks, world-renowned author and neurologist

across Cape York, Arnhem Land, and the Kimberley, supporting Aboriginal leaders seeking to promote their art and maintain cultural traditions.

Lance Bennett sadly died in 2013, just over a year after emergency neurosurgery at Royal Prince Alfred Hospital, where he received outstanding care.

“As an alumnus, it was Lance’s wish to leave a legacy to the University of Sydney and I am delighted that the Sydney Conservatorium has such a key role in this research. It is especially satisfying to me to be able to reciprocate by sponsoring this music intervention in RPA Hospital’s catchment,” Spencer says. “I feel he would give this research the high priority that I do. Although Lance and I had little direct experience of the condition, it is a great privilege to have this opportunity to support this vitally important work. We can all truly make a difference by supporting research of quality.”

Through the generosity of the Spencer-Bennett gift, the University has been able to form this innovative multidisciplinary collaboration to better understand the onset of neurodegenerative disease



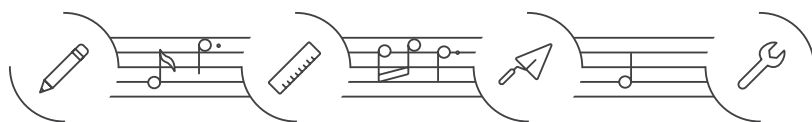
Photography supplied

Lance Bennett and Barbara Spencer: connecting music and neurodegenerative research through their generosity.

and to explore solutions in the present, with the potential for long-lasting impacts in the future.

“We believe music can potentially boost our neuroplasticity, our resilience, and also potentially slow cognitive decline, but we don’t have sufficient and robust evidence to support this claim,” says Naismith, from the Brain and Mind Centre. “That’s what this opportunity provides us with.” 🎵

RESEARCH STAGES



DESIGN musical intervention with input from people with mild cognitive impairment.

MEASURE neurobiological and clinical markers to establish impact (brain scans, memory, thinking skills, quality of life, mood).

BUILD research evidence base, demonstrating whether music training provides neuroprotective effects for older people at risk.

WORK with hospital memory and cognition clinics to translate intervention program into sustainable public health service.

IT STARTED WITH A PHONE CALL

“The Spencer-Bennett NeuroMusic Collaborative began during a conversation I had with Barbara over coffee. We met outside the Brain and Mind Centre and Barbara described her vision to bring together neuroscience research and her love of music. I have the privilege of working with talented people from across the University and was able to connect Barbara with researchers wanting to do exactly this sort of work. Whatever you’re passionate about, your gift can be life-changing. If you’re thinking of creating a powerful legacy by including a gift in your will, getting started is simple. I can connect you with transformational work happening at the University and advise you and your solicitor on your will wording to ensure it reflects your gift intentions and wishes. We’re committed to ensuring your vision for a better world can be realised here at the University of Sydney. Please reach out for a chat on [+61 2 9002 7455](tel:+61290027455).”

Alexandra Miller, Deputy Director, Planned Giving



Hydrogen
researcher
Professor
Kondo-Francois
Aguey-Zinsou is
working toward
a cleaner energy
future.

WORDS by George Dodd

PHOTOGRAPHY by Louise M Cooper

Guilt-free *energy*

Burn petrol, you get greenhouse carbon dioxide, some carbon monoxide, other gases and ash. Burn hydrogen, you get water. University researchers are developing new technologies to bring this clean energy hydrogen to everyone.

“I’M REALLY PASSIONATE ABOUT MAKING THINGS THAT ARE MEANINGFUL, THAT EMPOWER PEOPLE”

– Professor Kondo-Francois Aguey-Zinsou.

“ was a dinosaur in 2009,” says Professor Kondo-Francois Aguey-Zinsou. “I was still working on hydrogen when all the interest and funding switched to batteries. Nobody wanted to hear about hydrogen anymore.”

How times have changed. In 2020, the international investment firm Goldman Sachs said that green hydrogen, which is produced using carbon-free energy sources, was a once-in-a-generation opportunity that could give rise to a multi-trillion dollar global market by 2050.

The firm’s excitement was partly based around the potential for green hydrogen to decarbonise sectors of the economy where it’s currently hard to do so, like peak-load power generation, heavy-duty transport, and high-temperature manufacturing.

Working from the University’s School of Chemistry, Aguey-Zinsou is one of the world’s thought-leaders on hydrogen, focussed on refining and extending hydrogen-based technologies. But he has a wider social vision for it as well.

“We want to put this technology into people’s hands because it can be 3D printed almost anywhere using fully recyclable materials,” says Aguey-Zinsou. “People across the planet could have energy on a domestic level, so all of us can produce and sustain our individual energy needs. I think this is really where hydrogen is powerful.”

Though excited by these possibilities, Aguey-Zinsou flags a concern. “There’s a real danger that governments will want to monetise hydrogen for energy producers rather than create a practical and democratic hydrogen energy culture. That is why I think supporting the more open work of universities in this area is so important.”

Aguey-Zinsou’s philosophy of maximising the community benefit can be traced back to his birthplace, Benin in West Africa, and his father, who was politically active in removing the country’s French colonial shackles. At the same time, his French mother was determined Aguey-Zinsou would have a top-tier education which saw him, not entirely enthusiastically, enter a French boarding school at the age of 11. He now has three master’s degrees in complex subjects that support his hydrogen work.

“I don’t think of myself as having a studious nature,” says Aguey-Zinsou, in a rich accent that blends Benin and France. “But I am curious about things.”

So, why is hydrogen such a star of renewable energy?

Hydrogen is the most common element in the universe. Our sun is 92 percent hydrogen; it is energy-dense, having three times the energy content, by weight, of petrol. Also, a hydrogen fuel cell powerplant is about twice as efficient at generating electricity as a combustion-type power plant; hydrogen can be produced almost anywhere, from various sources including water. Unlike most fuels, it is non-toxic when burned.

Though, as always, the devil is in the detail.

Yes. Hydrogen is more energy-rich than petrol, but as a gas, it must be compressed for use in a car, for example, and needs a tank up to seven times bigger than for petrol. Liquid hydrogen for cars presents its own problems. It only exists at -253C, and in its liquid form, it is three times less energy-dense than petrol.

And while hydrogen is abundant in the universe, on earth it is an atom that likes company, and so is mostly bonded into molecules, most famously H₂O (water). That means to use hydrogen atoms as energy carriers, first you have to apply energy to free them.

Luckily this is straightforward, through a process called electrolysis that was discovered more than 200 years ago. By simply putting an electric current through water, the two hydrogen atoms

(H₂) will separate from the single oxygen atom (O) and bubble up for collection.

The easy part done, what happens to the hydrogen then has given Aguey-Zinsou a shopping list of things he is keen to achieve as quickly as his research resources will allow. In the past, philanthropic funding has accelerated his work, and he is grateful for a recent gift from the Thyne Reid Foundation. Additional support now would enable even faster acceleration, allowing him to dramatically advance hydrogen technologies, create more positions for bright new researchers, and equip his research labs with what his team needs to reach the goal of plentiful zero-carbon energy production and storage.

“There are so many avenues to pursue,” he says. “But one of the main goals right now is to take hydrogen production and storage to industrial scale. We’re also pretty excited about an idea for deploying the energy.”

That idea is called solid-state storage, which goes beyond compressing and

liquifying hydrogen. Instead, it allows hydrogen atoms to be held within a solid substance.

In the early days that substance was often magnesium, but Aguey-Zinsou and his team are investigating combinations of metals, termed intermetallics, to find one that would maximise hydrogen absorption and stability. This offers the possibility of hydrogen being part of a solid-state device that could be easily carried and plugged into fuel cells to drive vehicles and appliances. An electric bike and barbecue have already been built to successfully demonstrate the principle.

Another vital aspect of the work being done by Aguey-Zinsou’s team is making hydrogen production cheaper. As with most green technologies, affordability is particularly key.

Hydrogen is now mostly produced from natural gas (hydrogen created using fossil fuels is called ‘grey hydrogen’). This hydrogen costs around \$2 per kilo to produce (“Because there is nothing cheaper than just digging a hole in the ground,” Aguey-Zinsou notes), so he is working to push the cost of green hydrogen down from the current cost of \$6 per kilo to the \$2 benchmark that will make green hydrogen commercially viable. Progress has certainly been encouraging.

“I’m really passionate about making things that are meaningful, that empower people,” says Aguey-Zinsou. “And it’s not just me; I think there is a whole movement of people out there thinking the same way.” 🍷

BLUE SKY THINKING WITH GREEN ENERGY



ENERGY EXPORT

Once compressed or liquified, hydrogen can be exported to other energy markets.



BIGGER AND GREENER

Industrial-scale electrolyzers will transform energy-intensive industries while hydrogen power plants are twice as efficient as combustion plants.



READY FOR TAKE OFF

Hydrogen-powered passenger planes are in advanced development.



FAST AND CLEAN

Hydrogen fuel cells refuel cars much faster than lithium batteries, with no battery chemicals to dispose of.



HOME, GREEN HOME

Homes with solar cells, a domestic electrolyser, and a hydrogen storage battery could operate ‘off the grid’.

WORDS by Chloe Pryce

PHOTOGRAPHY by Stefanie Zingsheim

Going with *your gut*

Ellie à Beckett left an extraordinary gift in her will. The majority of her estate will advance bowel cancer research. Nine years on, researchers are working towards a future without bowel cancer, with help from some surprising collaborators – your gut microbiome.



Dr Erin Shanahan outside the lab where she investigates the microbiome's role in bowel cancer.

It's a fact that's hard to stomach: you are more bacteria than human. The approximately 39 trillion cells in these tiny organisms just outnumber the 30 trillion human ones in an adult body. Scientists are now beginning to understand how these billions of bacteria and other microbes, collectively known as the microbiome, work together to affect functions as diverse as digestion, heart function, mental health, and even the development – or treatment – of cancer.

Dr Erin Shanahan (BSc(Adv)(Hons) '07, PhD '14) has a personal stake in beating bowel cancer, also known as colorectal cancer: it has affected her family throughout her lifetime, with three grandparents and an aunt all having suffered through the disease. But it is her warmth and humour that shine through as she discusses her work on the microbiome, acknowledging it's "not necessarily dinner-time conversation."

"The surface area of the gut is absolutely enormous – flattened out, it could cover a studio apartment. This creates a massive area for microbes to grow in."

The organisms living in our guts are not innately harmful, but issues can arise when the hundreds of species become imbalanced. Our diet has an important role to play in managing these microbial hitchhikers: over time, the wrong diet can encourage a proliferation of species which impact surrounding gut cells, pushing them towards becoming cancerous.

As Shanahan quips, "what we eat is what they eat! We already know some risk factors, like diets which are low in fibre and high in processed meats. But we don't understand why, if you put 100 people on that 'bad' diet, they won't all develop bowel cancer. And the answer to that might lie in the microbiome."

A microbiologist and à Beckett Fellow, Shanahan conducts her research from the Charles Perkins Centre at the University of Sydney.

The fellowship was created when Emma Elwin "Ellie" à Beckett left a \$15 million bequest to the University following her death in 2013. Named after Ellie's brother, the William Arthur Martin à Beckett Cancer Research Trust has supported four Fellows and the establishment of a germ-free facility

– a space completely free of microbes, critical for studying the relationship between the microbiome and disease.

With work spanning preclinical studies through to patient-led care interventions for bowel cancer, the à Beckett Fellows stand as an extraordinary monument both to Ellie's love for her brother, and to the profound impact of endowed giving.

Bowel cancer is the third most diagnosed in Australia, with 15,000 new cases every year. When Martin à Beckett died in 1986, the five-year survival rate for bowel cancer stood at 55 percent with treatment largely focused on surgery, and chemoradiation just beginning to gain traction.

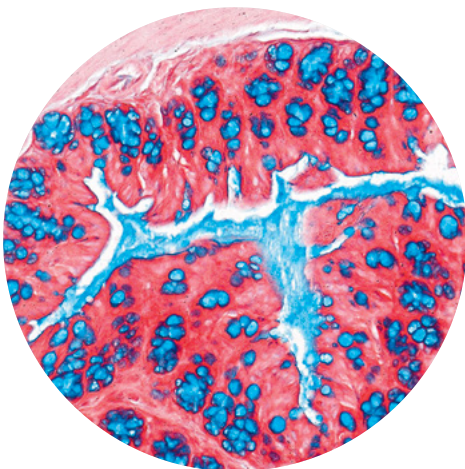
Today the five-year survival rate is 70 percent due to an increase in colonoscopies and screening, and the growing number of treatment options, including more targeted therapies.

Using personalised nutrition to treat cancer is central to Shanahan's two-pronged research. The first element of her study uses pre-clinical models and clinical data analysis to investigate what constitutes a healthy microbiome, including which dietary elements can encourage gut health, or affect tumour development.

Shanahan hopes this knowledge will help patients lower their risk of bowel cancer. For example, following a colonoscopy where polyps are discovered, doctors in future might advise a patient on specific dietary changes or supplements that could reduce the chances of developing a tumour.

"If we can inform an individual that eating red meat is particularly risky for them based on their unique microbiome, that's more powerful than generic advice to eat a healthy, high-fibre diet."

But it's the second component



This image shows healthy bowel tissue which has been stained for visibility. The light pink is intestinal muscle, dark pink shows mucosa which lines the intestine, and the blue is goblet cells which produce protective mucus. If there is disruption to the protective mucous layer, the dark pink cells may become cancerous, eventually resulting in a bowel cancer.

**“THIS GIFT WILL
KEEP ON GIVING...
THE KNOWLEDGE
AND IDEAS GENERATED
BY THE FELLOWSHIP
WILL BE INFORMING
STUDIES, AND HELPING
PATIENTS, LONG
AFTER THE MONEY
HAS BEEN SPENT.”**

– Dr Erin Shanahan

Photography supplied



Emma Elwin
"Ellie" à Beckett
in front of Wilton
House in Salisbury,
UK in 1956.

of her work which Shanahan seems most passionate about.

“In terms of a ‘breakthrough’, I’m really excited about my work in immunotherapy, and reactivating the immune system to try to target and kill cancer cells. Immunotherapy has been revolutionary in cancer treatment in recent years, and we’re interested in the emerging evidence that the gut microbiome has a role to play.”

The gut microbiome interacts with our immune system, and can stimulate the right types of immune responses to potentially eliminate a tumour – even one located nowhere near the gut. However, many immunotherapy patients suffer prohibitive side effects, or are unresponsive to treatment.

Shanahan is researching whether

biological signatures in the microbiome can predict which patients are likely to respond positively to immunotherapy. Longer term, the aim is to help more patients become part of this responsive group, through diet and other interventions.

“Although we are still designing clinical trials, I feel there is a direct pathway to change ahead. One clinician I work with has already begun talking to her patients about what might be possible for them in future.”

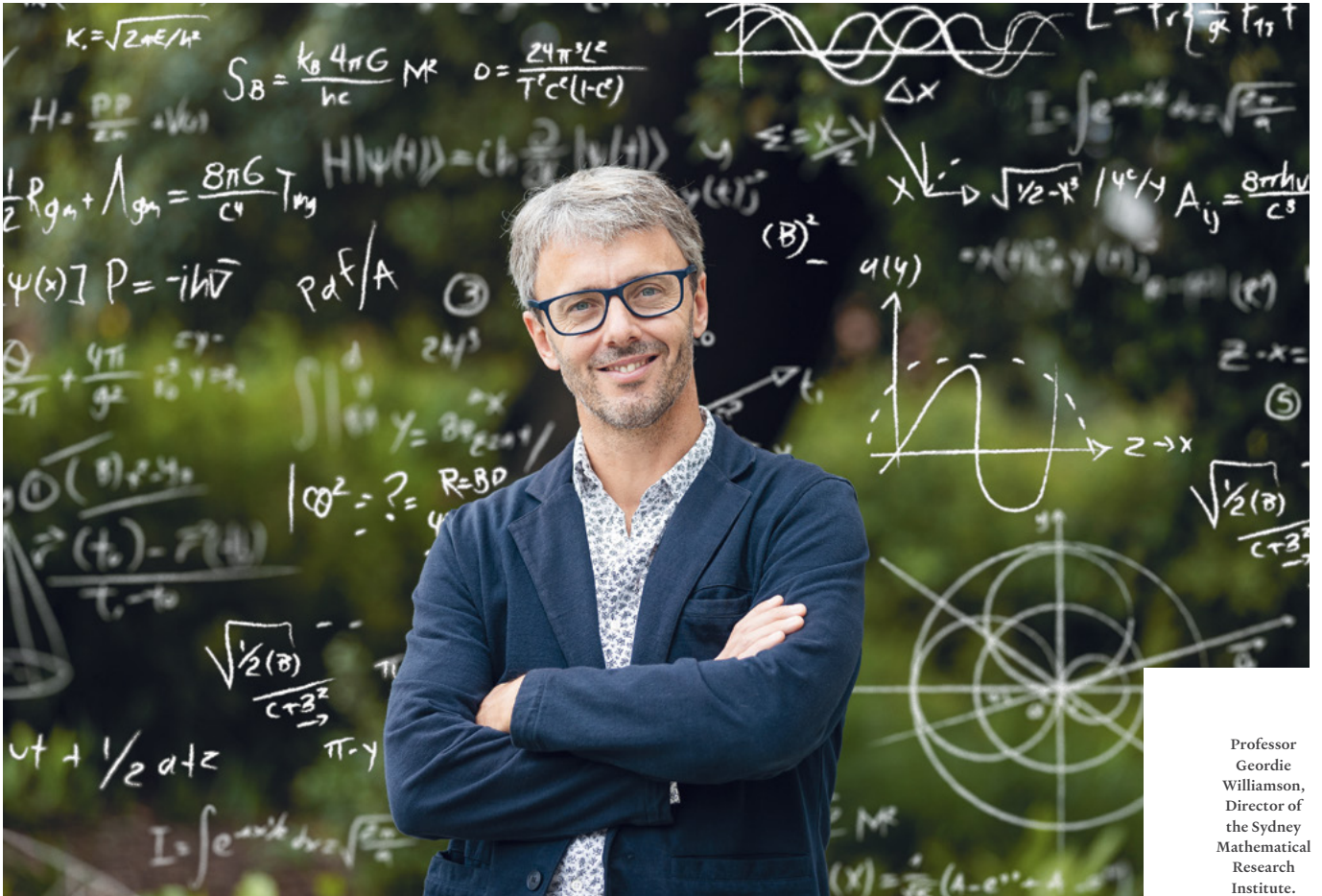
For Shanahan, the à Beckett Fellowship has provided the stability to build a comprehensive research program, in a field not traditionally associated with microbiology.

“Without Ellie’s gift, I wouldn’t be bringing my knowledge of

microbiology to colorectal cancer – she has enabled me to apply my expertise to a new, emerging area.

“It’s an incredibly generous thing to do,” says Shanahan, beaming. “This gift will keep on giving, beyond its original scope. As researchers, we are always building on what has come before. The knowledge and ideas generated by the Fellowship will be informing studies, and helping patients, long after the money has been spent.” 🌸

Thanks to the generosity of donors like Ellie à Beckett, life-changing research is possible. To find out more about leaving a gift in your will to the University of Sydney, please contact Alexandra Miller on +61 2 9002 7455. Email: alexandra.miller@sydney.edu.au



Professor Geordie Williamson, Director of the Sydney Mathematical Research Institute.

Adding *value*

For Professor Geordie Williamson and his colleagues, the task of establishing a mathematical research institute seemed an impossible problem to solve. Until a significant group of passionate donors stepped in.

WORDS by Jessie McGill

PHOTOGRAPHY by Louise M Cooper

Despite possessing a natural aptitude for the subject, Professor Geordie Williamson (BA(Hons) '04) wasn't always drawn to a career in mathematics. "As a kid, I loved mapping, drawing and measuring, that sort of thing," he says. "But I didn't particularly like maths at school." Growing up, a love of English and philosophy saw a young Williamson undertake a Bachelor of Arts at the University of Sydney. However, he never completely shifted focus from the science at which he was so skilled. "Maths became more and more interesting," Williamson explains. "I remember one class in my second year that I just loved, it seemed really deep and in third year it got deeper, and I started to feel that maths was something I could spend my life doing."

The choice to study mathematics at a tertiary level was fateful for Williamson, whose career has taken him to some of the world's most prestigious universities and research institutes. Notably, he was elected a Fellow of the Royal Society in 2018, the most respected continuously-running scientific academy. Today, he performs concurrent roles at the University of Sydney, as Professor of Mathematics and Director of the Sydney Mathematical Research Institute (SMRI).

Established in 2018, thanks to the generosity of the Simon Marais Foundation, the Hooper-Shaw Foundation, Dr Philipp Hofflin (Grad Dip Ec '95, PhD '99), and Dr Rebekah Jenkin, SMRI is the first institute of its kind in Australia, dedicated to mathematical research and vital collaboration between mathematicians. Each year, SMRI funds the visits of over thirty researchers, spanning all aspects of mathematical sciences. In doing so, the Institute acts as a hub for mathematical minds, attracting the best international colleagues to Australian shores. With this, SMRI performs a critical outreach role, promoting mathematics nationally and internationally.

“A space like SMRI has been on the agenda for Australian mathematicians for over twenty years,” states Williamson, who was “totally blown away” by the philanthropic support that brought SMRI to life. After meeting with some of the donors, “we went from idea to reality within a month,” he recalls, still clearly in awe of the belief and generosity of the Institute’s collective donors.

Broadly based on the Max Planck Institute for Physics and the Institute for Advanced Study at Princeton, SMRI’s researcher-in-residence model allows mathematicians to interact together at a high level, something which Williamson describes as “absolutely essential” to the research process. Arguing against the image of a lone professor slaving away at a theorem, Williamson points out that mathematicians are extremely communicative and intuitive. “The vast majority of breakthrough results happen when experts get together and mix their knowledge,” he says. “Sydney Mathematical Research Institute gives us the freedom and the focus to genuinely pursue our interests as researchers.” One area of interest Williamson has been able to pursue is the application of artificial intelligence techniques to mathematical problems – work he conducted in

conjunction with UK-based artificial intelligence laboratory DeepMind AI and colleagues at Oxford University.

Published in pre-eminent scientific journal *Nature* in December 2021, Williamson and his fellow authors trained AI models to look at very difficult and abstract questions in pure mathematics. With careful observation, the team was able to “peek under the hood” of AI models and study the logic and processes the computer employed to arrive at its correct answers. From here, the team reverse engineered the learning of the AI models and applied it to their own reasoning, formulating groundbreaking new insights into open mathematical problems such as knot theory and representation theory. By leveraging the strengths of machine learning, the researchers identified relationships and reached meaningful conclusions much faster than traditional workings would allow. Citing the work in *Nature* as his proudest research output since joining SMRI, Williamson believes machine learning is a tremendous source for good and could unlock even more insights in the future. From the use of maps to conducting banking, AI informs much of our daily lives, he observes. “If we can make progress on the hardest questions in mathematics, there’s no limit to the sorts of problems we could solve.”

Alongside research, part of Williamson’s role at SMRI is to attract more scholars to the “incredibly beautiful” discipline of pure mathematics. When asked what he would say to an aspiring young mathematician, Williamson is encouraging. “Don’t be scared,” he says, recalling the University mentors who taught him to trust his intuition and take great leaps as a student. He also has a message for those questioning the applicability of a maths qualification in 2022. “Forty years ago, mathematically gifted people had two options: become an actuary or maths teacher. Today, the

“THE VAST MAJORITY OF BREAKTHROUGH RESULTS HAPPEN WHEN EXPERTS GET TOGETHER AND MIX THEIR KNOWLEDGE.”

- Professor
Geordie Williamson

job landscape has changed, and maths is much more relevant in understanding almost all aspects of the world in which we live.”

This understanding of the deep relevancy of mathematics is something shared by the Institute’s donors. For Dr Philipp Hofflin, a foundational supporter and key campaigner for SMRI, the establishment of the Institute represents a breakthrough for Australia and the University of Sydney. “Unlike the United States and many European nations, Australia has not had a dedicated institution for the advancement of pure mathematics. SMRI brings us in line with the rest of the world, and this is something I’m extraordinarily proud to be a part of.”

Reflecting on the visionary generosity of these gifts, it’s clear Williamson believes a cultural shift has taken place in mathematics research. “As a remote nation, Australia suffered from the tyranny of distance and wasn’t seen as a viable option for international researchers, and as such, fundamental research was getting left behind,” he explains. By enabling “first-rate academics to undertake residencies alongside Australian researchers and students, the SMRI model changes this perception. Our gratitude to our donors is infinite.” 🌸



Bouillon
L. Pasteur
March 1888
Bordeaux

An original 1888 flask of broth made by Louis Pasteur, part of a series of experiments to rid NSW of rabbits.

Giving today. *Changing tomorrow.*

WORDS by Melany Clark

PHOTOGRAPHY by Stefanie Zingsheim and Louise M Cooper

Preserving a *body* of work

It is not every day you see a lung infected with 'Spanish flu', or a flask sealed by Louis Pasteur himself. Thanks to a pioneering group of donors, these and other rare pathological specimens will be preserved for future generations of students to study vital elements of human diseases.

Tucked away behind a discreet door off the foyer of the Charles Perkins Centre sits an unexpected room. Upon first glance, the rows of brightly lit, mostly pink objects bear the look of a cosmetic counter. But as you walk a little closer, and inspect more thoroughly, it becomes clear that these items, suspended in liquid within jars, are in fact human organs.

For over 135 years, the University of Sydney has held a special place for the preservation of pathology specimens. The collection is a fascinating and invaluable resource for students, educators, and researchers, and has even inspired artworks and literature. Now, thanks to generous donors, this collection is being cared for and digitised in perpetuity for future generations.

Among the 1500-plus specimens are rare pieces including a heart dating back to 1895, a lung infected with the deadly 'Spanish flu', and medical instruments used since the Sydney Medical School began teaching in 1883. One of the most prized exhibits is an original 1888 flask of broth made and sealed by Louis Pasteur.

Essential for seeing firsthand the impacts of disease on human organs, this collection has long been used by students, including Dr Edward "Ted" Kremer OAM (MBBS '70). Having studied medicine in the 1950s, he has always been captivated by historical instruments and specimens. Wanting to assist in securing its future, he asked his network if they would support the collection through philanthropy.

Dr Len Ainsworth AM was one of those people. “As a former medical student, and following further discussion, I said to Ted it would be my pleasure to help provide enduring resources to enable the collection to be maintained long term.

“I have a keen interest in medical research in quite a number of areas and understand and agree with the importance of the pathology collection and its long-term activities,” Ainsworth said. The collection is also maintained with the help of the Susan and Isaac Wakil Foundation, the Glendonbrook Foundation and the Hunt Endowment.

Over the last twenty years, the collection has grown and expanded under the skillful hand of its curator, Dr Murat Kekic (MSc '96, PhD '04). Having majored in biotechnology, he worked in the University's Museum of Human Anatomy and then went on to do his PhD in muscle proteins.

For Kekic, there is no average day. One day, he might collect tissue taken from autopsies or surgical procedures. The next, his team will preserve the specimens, constructing the perspex containers, fixing the items in place and adding preservation fluids.

With a mix of awe and inquiry, Kekic points to a hairball that's taken on the shape of the stomach of a habitual hair eater; a teratoma (tumours that have developed teeth and hair); and a black lung, which is shockingly dark, taken out of a coal miner.

As learning tools, they are irreplaceable. The black lung has helped inform work, health and safety processes, as it shows first-hand what happens without laws in place. For medical students, the need to know what diseases look like and how organs function while afflicted is critical. If you haven't seen it, you can't recognise it.

This is where the digitisation steps in, aided by Jim Cook, the Acting Manager of Digital Innovation Strategy. Cook muses that his role is to “help our academic friends into the light of tech innovation.” An off-the-shelf solution couldn't be found, and this gift has enabled the team to create a unique technological platform – Etaki. Etaki is a digital content management system to manage



“TECHNOLOGY PLAYS A VITAL ROLE IN PREPARING OUR STUDENTS FOR THEIR FUTURE WORK AND CREATING GRADUATES WHO ARE LEADERS IN THEIR FIELD.”

– Jim Cook

virtual reality, 3D and gigapixel content as well as microscopic, macroscopic and tomographic representations, all in one centralised, secure and accessible platform. The team used laser active scanning, MRI, and CT technology to digitise objects. The cloud-based solution provides an equitable experience for students who can't visit the museum in person, and also means students no longer need to download enormous files.

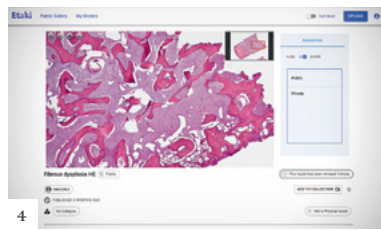
The next stage will expand into virtual reality and artificial intelligence. “This enhanced experience is as close as we can get to stepping inside a living body,” says Cook. “As an example, a



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1. Display cabinets within the collection
2. Snake bite antidote artefact
3. A lung specimen infected with 'Spanish flu'
4. The Etaki platform for students and researchers to access digitised versions of the physical collection.

heart specimen is only as big as a fist - it's hard to see at close range. With a high-resolution digital image, you can zoom in very close." Tutors can also annotate specimens, enabling a consistent and high-quality interactive experience for students.

"Ten years ago, teaching flipped to focus on real-world applications and interaction beyond the lecture theatre. Technology plays a vital role in preparing our students for their future work and creating graduates who are leaders in their field."

Cook's favourite feature is the ability to add sound, and he's looking forward to students hearing the difference between healthy and unhealthy lungs breathing. Or hearing a sedentary heartbeat compared to the heartbeat of an elite athlete while exercising.

The 3D models show these organs in situ to garner greater understanding of how they work together. Generally, students' only experience with real organs is through cadavers, whose lungs are deflated. Digital models can show the full range of motion and the impact inflation and deflation has on other organs.

Opportunities for research are expanding too, with the technology offering newfound capability to share the collection with other universities, while adhering to legislative requirements. Timely indeed: with renewed interest – encouraged by the coronavirus – to understand the pathologies of the past. One of the rarest items – a lung infected with 'Spanish flu' – is drawing the attention of researchers from across the globe, as this specimen is the most complete known sample. Researchers can take a slice from the organ and extract genetic material to chart the history of the virus over many years.

"We can learn a lot from the past about how things evolve," says Kekic. "Even over the last 100 years, there have been staggering advancements in medicine. This is a capsule of the past that's informing the future. In 100 years from now, imagine what will be possible."

It is striking to think what these vital learning aids will enable for future generations, thanks to the generosity of forward-thinking donors today. 🌟



Dr Murat Kekic in the Ainsworth Interactive Collection of Medical Pathology.



Photography: Thorny Vision

The *Art* of Giving

A scholarship made possible by a generous bequest from Marie Olive Armstrong OAM is helping Caitlyn to explore cultural identity, while pursuing her artistic career ambitions.

WORDS by Cassandra Hill

DEGREE Bachelor of Visual Arts

SCHOLARSHIP Marie Olive Armstrong Scholarship for Indigenous Students

Townsville-born Caitlyn sometimes wanders through Sydney’s Newtown and down to Circular Quay, taking in the street art and culture of the Harbour city.

“It’s so rich and informing, it’s different to a gallery environment where everything’s a bit out of reach for interaction,” Caitlyn says, “whereas in the streets around here you can just really engage with art on an individual, intimate level.”

The third year Bachelor of Visual Arts student, a Kamilaroi woman, draws on a myriad of influences in her own artworks.

“I’m a traditionally-educated artist, using oil paints, acrylics and more tactile materials. I also try to encourage a lot of my self-identity and culture within my works, but as I’ve been learning about different contemporary artists, city-based artists, I’ve been working more towards the digital side. I’m trying to flip the narrative - allowing Indigenous art to be contemporary, in a way that’s relevant to the society I’m living in.”

The first person in her family to go to university, Caitlyn was overwhelmed when she heard that she was the first recipient of the Marie Olive Armstrong Scholarship for Indigenous Students.

“I had a bit of a cry, I think it was genuine relief, because being relatively independent down here away from home, things can get stressful at times,” Caitlyn says. “It just helps me to focus on my studies. With art, you’re encouraged to really shoot for the stars, but you often need to draw on your own resources. Without this, I’d probably just be stressing and restricting myself as to what I can produce. I couldn’t be more grateful for such support.”

Marie Olive Armstrong, who died in 2020, left a bequest for an in-perpetuity scholarship for Indigenous students. It provides support for studies in music, visual art, performance, dance, creative writing, or poetry. Armstrong was active in the performing arts herself. As a member of Newtown Theatre from the age of 18 to 73, she acted in, choreographed, and directed plays, and held roles as its president and vice-president. A passionate advocate for the rights of Aboriginal and Torres Strait Islander people, she was awarded a Medal of the Order of Australia in 1986 for service to the community.

Caitlyn would have liked to meet her. “I would like to say thank you for believing in me, for putting faith in me, as a young Aboriginal artist,” Caitlyn

“I WOULD LIKE TO SAY THANK YOU FOR BELIEVING IN ME, FOR PUTTING FAITH IN ME, AS A YOUNG ABORIGINAL ARTIST.”

– Caitlyn

says. “Just having support from someone I haven’t even met – and yet she’s willing to go ahead and really push me forward to things that I probably initially wouldn’t have been doing.”

Caitlyn set her sights on going to university when she was just 14. During high school, she took part in the University’s Widening Participation and Outreach summer program, which provides opportunities for Indigenous students to experience university life. She says this gave her confidence to apply for university.

Now, Caitlyn is looking towards finishing her degree and is planning her final major work.

“I think particularly with the scholarship being tied to culture, I’m keeping that at the forefront of everything I’m producing,” Caitlyn says. “I see my final work as a love letter to everything I’ve learned from the past three years.”

And what about plans beyond university?

“As a kid, I always wanted to showcase my works in a gallery and freelance on the side, but also to work in the entertainment and theatre business,” Caitlyn says. “I’ve always been infatuated by the ways visual development artists can conceptually create such vivid and realistic works. I would love to work in Hollywood – like showbiz aspirations but for behind the scenes – why not dream big?”

Marie Olive Armstrong would no doubt have admired Caitlyn’s ambition, having spent time in Los Angeles in the 1970s herself, studying acting and socialising with Hollywood screenwriters.

“Having someone that’s willing to invest in my creative pursuits, I think that’s fully solidifying where I’m going to be taking my direction as a visual artist, a direction which will be extremely rewarding. I know I’ll be able to get there, regardless of how long it takes,” Caitlyn says.

“Having that backing and belief from the University and from the donor, pushes me forward to step further out of my comfort zone than I already have.” 🌸

Photography supplied



Marie Olive
Armstrong
OAM

Business students are showing their market value and driving social change with an innovative new learning opportunity.

Investing in the future

WORDS by Jemima Rohekar



Over recent years, the stock market has shown both bull and bear tendencies. The pandemic, in particular, has been a challenging time for fund managers, who have had to respond to volatility in the securities market and the panic-induced market sell-off. Despite notable challenges, it was also the ideal learning environment for students at the University of Sydney Business School aspiring to a career in portfolio management.

Moving beyond lectures and trading simulations, the business school offers the opportunity for students to apply their learnings to the management of real stocks through the Student Managed Investment Fund (SMIF). One such student is third year Bachelor of Commerce/Bachelor of Advanced Studies student Andre Thomas, who aims to start his career by working as an investment banking analyst. “I took this course knowing I would be stimulated by real-world events and market changes that would challenge me to form my own views and build on my knowledge base,” says Thomas.

Jiri Svec (BCom ’04, BEng(Mech) ’04, BCom(Hons) ’05, PhD ’09), Senior Lecturer and academic mentor for the course, recalls the “blank look” on students’ faces as their portfolio dropped close to 30 percent over several weeks, triggered by the pandemic. But the portfolio recovered quickly, and students were able to enjoy decent gains by the end of the year.

“Real investments provide students with a high degree of decision-making responsibility that cannot be easily replicated with other modes of teaching, such as the opportunity to practice real-life shareholder advocacy and to influence the direction of firms,” he says.

The SMIF was established in March 2017 to provide students with real-world experience. Another aspirational purpose was built into the design, too, that of repurposing a portion of the profits to fund student scholarships. To ensure this philanthropic arm could be sustained long-term, the scholarships were to begin only after the total value of the portfolio had reached \$500,000.

All of this was made possible through a generous donation by global investment firm TDM Growth Partners, who also kindly provide guest lectures to the students. From 2022, the sustained effort and savvy investment choices of current students will help others, like them, achieve their dreams of studying at the University of Sydney.

“The philanthropic element of the portfolio is a rewarding experience,” says Thomas. “It has provided an additional motivation to maximise my contribution to the fund, powered by the knowledge that my efforts could directly impact the study experience of a future student at the University.”

Svec agrees that the added level of generosity and responsibility gives students a higher purpose and sense of ownership. Along with co-mentor and lecturer Hamish Malloch (BSc/BCom ’06, BCom(Hons) ’06, PhD ’11), Svec is hopeful of the fund’s potential to be a powerful driver of social change. “While the fund already has the capacity to support several ongoing scholarships from its existing cash flow and profits,” he notes, “I am hopeful that as it grows, and the alumni promote its benefits in the industry, we will be able to attract further gifts and support more students.” 🌱

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